



**ATF-13336**  
2-16 GHz Low Noise  
Gallium Arsenide FET

T-31-25

**Features**

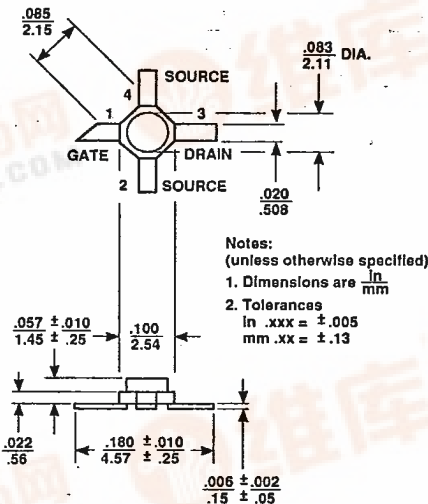
- Low Noise Figure: 1.4 dB typical at 12 GHz
- High Associated Gain: 9.0 dB typical at 12 GHz
- High Output Power: 17.5 dBm typical P<sub>1dB</sub> at 12 GHz
- Cost Effective Ceramic Microstrip Package
- Tape-and-Reel Packaging Option Available<sup>2</sup>

**Description**

Avantek's ATF-13336 is a high performance gallium arsenide Schottky-barrier-gate field effect transistor housed in a cost effective microstrip package. Its premium noise figure makes this device appropriate for use in the second stage of low noise amplifiers operating in the 2-16 GHz frequency range.

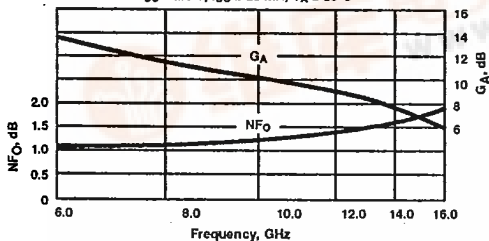
This GaAs FET device has a nominal 0.3 micron gate length with a total gate periphery of 250 microns. Proven gold based metallization systems and nitride passivation assure a rugged, reliable device.

**Avantek 36 micro-X Package<sup>1</sup>**



Notes:  
(unless otherwise specified)  
1. Dimensions are in mm  
2. Tolerances  
in .xxx = ±.005  
mm .xx = ±.13

OPTIMUM NOISE FIGURE AND ASSOCIATED GAIN vs. FREQUENCY  
V<sub>DS</sub> = 2.5 V, I<sub>DS</sub> = 20 mA, T<sub>A</sub> = 25°C



Noise Parameters: V<sub>DS</sub> = 2.5 V, I<sub>DS</sub> = 20 mA

Freq. GHz	NF <sub>0</sub> dB	Gamma Opt Mag	Ang	RN/50
4.0	0.8	.63	93	.27
6.0	1.1	.47	138	.10
8.0	1.2	.40	-153	.20
12.0	1.4	.52	-45	.88
14.0	1.6	.57	-2	1.3

**Electrical Specifications, T<sub>A</sub> = 25°C**

Symbol	Parameters and Test Conditions	Units	Min.	Typ.	Max.
NF <sub>0</sub>	Optimum Noise Figure: V <sub>DS</sub> = 2.5 V, I <sub>DS</sub> = 15 - 30 mA	f = 8.0 GHz dB f = 12.0 GHz dB f = 14.0 GHz dB		1.2 1.4 1.6	1.6
GA	Gain @ NF <sub>0</sub> : V <sub>DS</sub> = 2.5 V, I <sub>DS</sub> = 15 - 30 mA	f = 8.0 GHz dB f = 12.0 GHz dB f = 14.0 GHz dB	8.0	11.5 9.0 7.5	
P <sub>1dB</sub>	Output Power @ 1 dB Gain Compression: V <sub>DS</sub> = 4 V, I <sub>DS</sub> = 40 mA	f = 12.0 GHz		17.5	
G <sub>1dB</sub>	1 dB Compressed Gain: V <sub>DS</sub> = 4 V, I <sub>DS</sub> = 40 mA	f = 12.0 GHz		8.5	
g <sub>m</sub>	Transconductance: V <sub>DS</sub> = 2.5 V, V <sub>GS</sub> = 0 V	mmho	25	55	
I <sub>DSS</sub>	Saturated Drain Current: V <sub>DS</sub> = 2.5 V, V <sub>GS</sub> = 0 V	mA	20	50	100
V <sub>p</sub>	Pinchoff Voltage: V <sub>DS</sub> = 2.5 V, I <sub>DS</sub> = 1 mA	V	-4.0	-1.5	-0.5

Notes: 1. Long leaded 35 Package available upon request.  
2. Refer to PACKAGING section "Tape-and-Reel Packaging for Surface Mount Semiconductors".



**ATF-13336, 2-16 GHz**  
**Low Noise Gallium Arsenide FET**

T-31-25

**Absolute Maximum Ratings**

Parameter	Symbol	Absolute Maximum <sup>1</sup>
Drain-Source Voltage	V <sub>DS</sub>	+5 V
Gate-Source Voltage	V <sub>GS</sub>	-4 V
Drain Current	I <sub>DS</sub>	I <sub>DSS</sub>
Power Dissipation <sup>2,3</sup>	P <sub>T</sub>	225 mW
Channel Temperature	T <sub>CH</sub>	175°C
Storage Temperature <sup>4</sup>	T <sub>STG</sub>	-65°C to +175°C

Thermal Resistance:  $\theta_{jc} = 400^\circ\text{C/W}$ ; T<sub>CH</sub> = 150°C  
 Liquid Crystal Measurement; 1  $\mu\text{m}$  Spot Size<sup>5</sup>

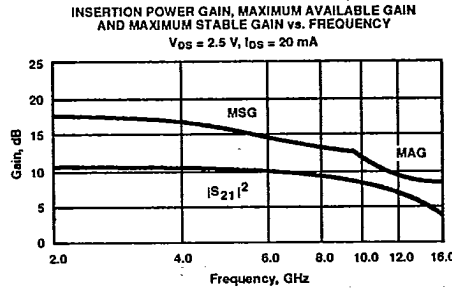
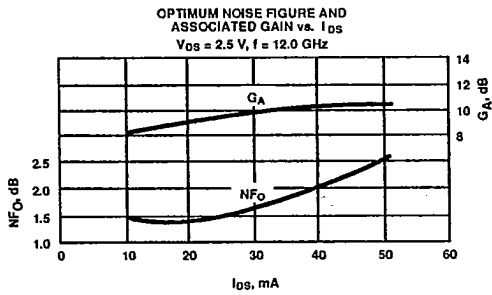
**Notes:**

1. Operation of this device above any one of these parameters may cause permanent damage.
2. Case Temperature = 25°C.
3. Derate at 2.5 mW/°C for T<sub>CASE</sub> > 85°C.
4. Storage above +150°C may tarnish the leads of this package difficult to solder into a circuit. After a device has been soldered into a circuit, it may be safely stored up to 175°C.
5. The small spot size of this technique results in a higher, though more accurate determination of  $\theta_{jc}$  than do alternate methods. See MEASUREMENTS section for more information.

**Part Number Ordering Information**

Part Number	Devices Per Reel	Reel Size
ATF-13336-TR1	1000	7"
ATF-13336-TR2	4000	13"
ATF-13336-STR	1	STRIP

**Typical Performance, T<sub>A</sub> = 25°C**  
 (unless otherwise noted)



**Typical Scattering Parameters: Common Source, Z<sub>0</sub> = 50  $\Omega$**

T<sub>A</sub> = 25°C, V<sub>DS</sub> = 2.5 V, I<sub>DS</sub> = 20 mA

Freq. GHz	S <sub>11</sub>			S <sub>21</sub>			S <sub>12</sub>			S <sub>22</sub>	
	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang	
2.0	.96	-51	10.6	3.39	127	-27.1	.044	57	.61	-41	
3.0	.88	-75	10.3	3.28	106	-23.4	.060	33	.58	-51	
4.0	.86	-96	10.1	3.19	86	-22.6	.074	25	.57	-57	
5.0	.79	-117	9.9	3.13	66	-20.6	.093	12	.54	-65	
6.0	.69	-142	10.2	3.22	46	-18.9	.114	1	.49	-79	
7.0	.60	-178	10.1	3.21	21	-17.6	.132	-18	.42	-97	
8.0	.54	141	9.8	3.10	-4	-17.3	.137	-33	.31	-112	
9.0	.56	103	8.9	2.80	-26	-16.7	.147	-48	.21	-121	
10.0	.56	74	8.3	2.60	-48	-16.5	.150	-63	.09	-145	
11.0	.58	44	7.6	2.39	-68	-16.8	.145	-78	.07	89	
12.0	.63	20	6.7	2.17	-90	-17.5	.133	-95	.16	43	
13.0	.65	3	6.0	2.00	-108	-18.3	.121	-107	.19	21	
14.0	.66	-7	5.5	1.89	-126	-18.9	.114	-121	.19	-4	
15.0	.70	-19	4.9	1.76	-144	-19.0	.112	-129	.16	-28	
16.0	.72	-34	4.4	1.66	-175	-19.2	.110	-142	.14	-32	

A model for this device is available in the DEVICE MODELS section.